Structure of the Juan de Fuca Plate and Washington Forearc from 2D Travel Time Tomography of OBS and Land Seismometer Data along and East-West Transect

Details

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Authors	Carton, H D*, LDEO, Palisades, NY, USA Canales, J, WHOI, Falmouth, MA, USA Janiszewski, H A, LDEO, Palisades, NY, USA Carbotte, S M, LDEO, Palisades, NY, USA Abers, G A, LDEO, Palisades, NY, USA Trehu, A M, Oregon State University, Corvallis, OR, USA Nedimovic, M R, Dalhousie University, Dalhousie, NS, Canada
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Abstract

In the summer of 2012 an offshore-onshore active source experiment was conducted spanning the Juan de Fuca plate and transecting the Cascadia margin at two locations. Two plate-scale transects offshore Oregon and Washington were designed to characterize the structure and evolution of the oceanic crust and uppermost mantle as the plate ages from formation at the Juan de Fuca Ridge to subduction at the Cascadia trench. They will provide evidence on how and where incorporation of water is taking place, and, further into the subduction zone, they will provide information on forearc structure and the subducting crust as it begins to dewater beneath the megathrust. Along the northern transect, airgun shots from R/V Lanseth's 6600 cu in array were fired at an interval of 500 m from the Endeavour segment on the Juan de Fuca Ridge to the 1000 m water depth contour on the wide accretionary wedge off Grays Harbor. These shots were recorded on 22 Ocean Bottom Seismometers

(OBS) at ~15 km spacing along track and 15 land stations deployed in an ~140 km long east-west corridor in Washington. Two other sets of shots, at 37.5 m interval on the oceanic plate, and at 50 m interval on the wedge and shelf ~14-78 km from shore (thus extending shooting landward), were also recorded on the 15 land stations, and provide data that are easier to pick. Arrivals can be identified out of to a maximum of ~100 km on OBSs located on the oceanic plate and accretionary wedge, and a maximum of ~140 km on the land instruments. The two OBSs closest to shore (< 300 m water depth) returned noisy data and/or had issues. So far first arrivals (Psed, Pg and Pn) have been picked on the OBS gathers, which also show clear PmP phases. We will present two-dimensional P-wave travel time tomography results using the onshore-offshore wide-angle data from this northern transect.

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